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# CHEMICAL AND HYGIENIC QUALITY OF MILK SUPPLIED TO CANTEENS OF VARIOUS EDUCATIONAL INSTITUTIONS IN FAISALABAD CITY

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The chemical composition and hygienic quality of milk marketed at the canteens of various educational institutions located in the city of Faisalabad, were determined using the standard techniques. The following average values for the major milk constituents were observed: water, 92.99%; fat, 2.17%; protein, 2.48%; SNF, 4.84%; lactose, 1.79% and ash, 0.57%. The tests carried out for evaluating the hygienic quality of the milk samples showed the following results: titrable acidity, 0.098%, microscopic count, 3,93,580 per ml and *coliform* count, 48,492 per ml. The time for the reduction of methylene blue dye in milk samples collected from canteens of educational institutions was: less than half an hour, 2.73%; less than two hours, 5.45%,; less than five hours, 12.73% and over eight hours, 79.09%. The results suggest that the milk sold at these canteens is extensively put to malpractices such as skimming and adulteration with water which are probably carried out during the handling of milk starting from milking till it reaches the consumers.

## INTRODUCTION

Wholesome milk and milk products have an important place in supplying palatable, refreshing, nutritious, safe, economical and convenient food to human beings. Milk can be digested by young and old, regardless of the status of their teeth. However, all the properties attributed above to milk would only be possessed by it when it is available in an unadulterated form and has been produced under hygienic conditions.

Research on the chemical composition stems largely from the nutritional importance of milk in the human diet and to meet the legal and marketing requirements governing its sale. Legal minimum standards of 3.5 and 5.0% butter fat and 8.5 and 9.0% solids-not-fat for cow and buffalo milk respectively, were first introduced in this part of Indo-Pak subcontinent through Punjab Pure Food Act, 1930. One of the objectives of this food act was to assist in the detection of milk adulteration which is a common problem in many developing countries. Unhealthy practices in the production and handling of a product like milk not only lower its nutrient contents but also to a large extent, make it unhygienic for human use. Supply of clean and wholesome milk at canteens in educational institutions is of crucial importance as the milk supplied is to be consumed by the young and rapidly growing students. Therefore, a study was planned to determine the chemical composition and hygienic quality of milk supplied to canteens at various educational institutions located in Faisalabad city.

## MATERIALS AND METHODS

One hundred and ten samples of milk were collected, one sample each per week from the canteens of the following educational institutions located in various localities of Faisalabad city:

1. University of Agriculture
2. Punjab Medical College
3. Govt. College, Faisalabad
4. Govt. Degree College, Samanabad
5. Govt. College of Science
6. Govt. College of Education
7. Govt. College of Technology
8. Govt. Islamia College
9. Govt. Municipal College of Commerce
10. Municipal Degree College

The samples were collected in sterile bottles and kept in a thermos flask containing ice in order to check further bacterial activity. Soon after tests related to bacteriological analysis were carried out.

### a. Chemical composition

i. Fat percentage: Gerber's method (Khan *et al.*, 1983).
ii. Protein percentage: Formal titration method (David, 1977).
iii. Lactose percentage: By difference [per cent total solids -(per cent fat + protein + ash)].
iv. Ash percentage: Gravimetric method (A.O.A.C., 1984).
v. Solids-not-fat and total solids percentage: Fleishman's formula (Khan *et al.*, 1983).

### b. Hygienic quality

i. Titrable acidity (Khan *et al.*, 1983).
ii. Methylene blue reduction test (Anonymous, 1977).
iii. Direct microscopic count (Anonymous, 1977).
iv. *Coliform* count (Anonymous, 1977).

## RESULTS AND DISCUSSION

### a. Chemical composition

**Fat content:** The average fat content was 2.17 ± 0.06%. Taking 5% butter fat in unclassified milk as the legal standard (West Pakistan Pure Food Rules, 1965), it was observed that none of the milk samples from various educational institutions canteens was even close to the 5% level.

**Solids-not-fat (SNF):** The mean values for SNF contents as observed in the present study were 4.84 ± 0.12%. Judged on the basis of legal milk standard (9% SNF) enforced in Pakistan, the SNF content in the milk samples from educational institutions canteens was found to be much lower. The SNF content as observed in this study was even less than that reported for cow milk by Tilkaratne *et al.* (1975) and Ishaq and Shah (1975) although cow milk is considered to have less SNF content than buffalo milk.

**Protein:** In the present study, protein of milk sold at canteens averaged 2.48 ± 0.031%. Such a low protein content, probably, resulted from gross adulteration of milk with water.

**Lactose and ash:** The average values for lactose and ash contents determined during this investigation were 1.79 ± 0.104 and 0.57 ± 0.019%, respectively. The average values for lactose and ash in the market milk as reported by Shah (1972) are much higher than those found in the present study.

**General discussion:** As revealed by a part of the results of this study it is hard to believe

any more the universally accepted statement that milk is nearly a perfect food. This certainly does not seem applicable to the milk presented for sale at the canteens attached to various educational institutions in the city of Faisalabad. It is painful to note that young students of various educational institutions are forced to consume this so called milk which is not a wholesome milk but simply a fluid milky in colour. Due to the deceitful skimming and gross adulteration which most of the market milk undergoes, it loses its wholesomeness, nutritive character, taste, etc., before reaching the consumer.

of educational institutions are almost similar to those in freshly obtained normal cow's milk (Anonymous, 1977). Titrable acidity of milk increases rapidly as the storage temperature increases (Ortega *et al.*, 1971 and Korcleva *et al.*, 1974).

**Direct microscopic count:** The mean microscopic count was 3,93,580 ± 19,809/ml. These results are different from the results obtained for market milk of Faisalabad city by Shah (1972). However, these are in accordance with the findings of Gerlach and Kielwein (1972) who observed that in the

**Table 1. Chemical composition of milk samples collected from canteens of various educational institutions**

| Constituents | Mean ± SE (%) | Range (%) |
|---|---|---|
| Water | 92.99 ± 0.192 | 89.50-96.30 |
| Fat | 2.17 ± 0.060 | 1.00-4.00 |
| Protein | 2.48 ± 0.031 | 1.90-3.40 |
| Lactose | 1.79 ± 0.104 | 0.01-4.59 |
| Ash | 0.57 ± 0.019 | 0.20-0.92 |
| Solids-not-fat | 4.84 ± 0.120 | 2.51-7.96 |
| Total solids | 7.01 ± 0.150 | 3.70-10.50 |

**Table 2. Per cent acidity and microscopic and *coliform* counts in the milk samples collected from the canteens of educational institutions**

| Per cent acidity | Microscopic count per ml | *Coliform* count per ml |
|---|---|---|
| Mean (%) | Mean ± SE | Mean ± SE |
| 0.098 | 3,93,580 ± 19,809 | 48,492 ± 3,970 |

## b. Hygienic quality

**Titrable acidity:** The average values for per cent acidity were 0.098. The values obtained in this study for milk samples from canteens

market milk samples only 10% had < 5,00,000 bacteria per ml of milk.

*Coliform* **count:** The average count was 48,492 ± 3,970 per ml of milk. The values

obtained for *Coliform* count in this study are far less than those reported by Shah (1972) for market milk. May be shah (1972) used raw milk for his study, while in the present study heated/boiled milk was used.

**Methylene blue reduction test:** Only 2.73% milk samples were such in which the dye got decolourized within first half an hour. The dye reduced within two and five hours in 5.45 and 12.73% milk samples respectively. In 79.09% of milk samples, methylene blue reduction did not take place till the end of eight hours.

In conclusion it may be stated that the milk sold at these canteens is extensively put to the malpractices such as skimming and adulteration with water, carried out during the handling of milk starting from milking till it reaches the canteens/consumers. Thus the milk marketed at these canteens cannot in all fairness, be regarded as 'milk' in its real sense as it neither contains the minimum desired level of fat and SNF nor it is handled and kept under sanitary conditions.

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